TOOELE
ARMY
DEPOT

REVISED FINAL

DECISION DOCUMENT
SWMU 10 - TNT WASHOUT FACILITY
KNOWN RELEASES SWMUs
TOOELE ARMY DEPOT
TOOELE, UTAH

Contract No. DACA31-94-D-0060
Delivery Order No. 1

Prepared for:

TOOELE ARMY DEPOT
Tooele, Utah 84074

Prepared by:

URS

7101 Wisconsin Avenue, Suite 700
Bethesda, Maryland 20814

DISTRIBUTION UNLIMITED
APPROVED FOR PUBLIC RELEASE

OCTOBER 2003

Printed on Recycled Paper

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Revised Final Decision Document
for Known Releases Solid Waste Management Unit 10

The Decision Document

After completion of a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and Corrective Measure Study (CMS) for the Known Releases Solid Waste Management Units (SWMUs), the Tooele Army Depot (TEAD) has identified a corrective measures alternative for soil and groundwater contamination at the TNT Washout Facility (SWMU 10).

- Excavate contaminated soil, treat by composting, return treated soil to the excavated area, monitor the groundwater plume, and apply land use restrictions to prevent residential use. [$2,470,000]

Figure 2, page 5, of this Decision Document shows the location of SWMU 10.

These corrective measures will significantly reduce risk to human health and the environment.

A public meeting to discuss the corrective measures proposed for the Solid Waste Management Units in this Decision Document was conducted July 17, 2002. No comments from the public were received.

The Community's Role in the Selection Process

The Army solicited input from the community on the actions proposed in the Corrective Measures Study at a public meeting on July 17, 2002. TEAD established a comment period from July 1 to 31, 2002, to encourage public participation in this process. At the public meeting, the Army presented the SWMU 10 results of the RFI, the CMS, and the Decision Document; answered questions; and solicited both oral and written comments. Representatives of the EPA and State of Utah were present to answer questions.

During the public comment period, the community was encouraged to submit a formal comment in any of the following ways:

1. Mail written comments to:
   Tooele Army Depot
   Attn: SMATE-CS-EO/Larry McFarland
   Environmental Management Division
   Building T8
   Tooele, UT 84074-5000

2. Fax written comments to (435) 833-2839

3. Offer verbal comments during the public hearing.

No comments oral or written were received from the public during (or after) the comment period.

For More Information

The Decision Document for SWMU 10 highlights information that can be found in greater detail in the Known Releases SWMUs RFI Report, the CMS Report, and other available reports. These reports are contained in the TEAD Administrative Record.

The Decision Document will be added to the Administrative Record upon completion. The Army encourages the public to review and comment on these supporting documents, which are available at the following locations:

Tooele Army Depot
Public Affairs Office
T-1 Headquarters Building
Tooele Army Depot, UT 84074

Tooele Public Library
47 East Vine Street
Tooele, UT 84112

Marriott Library
University of Utah
372 S. Marriott
Salt Lake City, UT 84112

Grantsville Public Library
198 West Main Street
Grantsville, UT 84029

TNT WASHOUT FACILITY (SWMU 10)

The Trinitrotoluene (TNT) Washout Facility was constructed in 1948 and was operable through 1986. Operations at SWMU 10 consisted of decommissioning munitions filled with explosives. The munition casings were rinsed with water that was discharged to unlined washout ponds. The ponds have since been covered with a plastic liner and 1 foot of clean soil.

Soil, sediment, and groundwater samples were collected to determine if contamination exists as a result of previous activities. Explosives were detected in surface and subsurface soil in the area of the old washout ponds. Elevated levels of explosives were also detected in groundwater.

Without remediation, the elevated levels of explosives in soil beneath the liner to 7 feet below ground surface pose potential adverse health effects to onsite military workers. Elevated risks and hazards were identified for the hypothetical future onsite resident.

The sitewide ecological assessment determined that the explosives detected in soil at SWMU 10 potentially present an unacceptable ecological risk from vegetation growing on the old washout ponds.

The reasonably anticipated future land use of SWMU 10 is military. The area of the old washout ponds requires corrective action. The estimated volume of contaminated soil is 5,000 cubic yards.

Comparative Analysis of Alternatives
TNT Washout Facility (SWMU 10)

Evaluation Criterion (a)		Alt. 1: Composting, groundwater monitoring, land use restrictions	Alt. 2: Composting, groundwater treatment, land use restrictions	Alt. 3: Bioslurry, groundwater monitoring, land use restrictions	Alt. 4: Excavation, treatment/ disposal, groundwater monitoring, land use restrictions	Alt. 5: Multilayer cap, groundwater monitoring, and land use restrictions
Technical	Performance	High	High	Moderate	High	Moderate
	Reliability	High	Moderate	Moderate	High	Moderate
	Implementability	High	Moderate	Moderate	High	Moderate
	Safety	Moderate	Moderate	Moderate	Moderate	High
Human health assessment		High	High	High	High	High
Environmental assessment		High	High	High	High	High
Administrative feasibility		High	High	High	High	High
Cost		$2,470,000	$4,450,000	$4,260,000 (Argonne process) $4,240,000 (SABRE process)	$4,170,000	$2,130,000
Relevant section in Corrective Measures Study		3.2.1	3.2.2	3.2.3	3.2.4	3.2.5

(a) Rankings indicate the effectiveness of each alternative in meeting the evaluation criteria, relative to other alternatives.

Corrective Measures Alternative for TNT Washout Facility (SWMU 10)

Alternative 1:

Excavation of contaminated soil, on-site soil and vegetation composting, groundwater monitoring, and land use restrictions are the recommended corrective measures for the TNT Washout Facility.

CONTENTS

INTRODUCTION*

This ***Decision Document*** briefly discusses the preferred ***corrective measures*** alternative and supporting analyses for one ***solid waste management unit (SWMU)*** at Tooele Army Depot (TEAD), Tooele, Utah. The SWMU is listed below:

- SWMU 10 (Trinitrotoluene (TNT) ***Washout*** Facility)

The Known Releases SWMUs CMS Work Plan identified seven Known Releases SWMUs which posed human health or environmental risks. All seven SWMUs were included in a Final Known Releases SWMUs Decision Document issued in December 2001. However, based on discussions between the U.S. Army and State and Federal regulators, SWMU 10 was issued separately to allow for additional data gathering.

This document is issued by the U.S. Army (the owner of TEAD), the U.S. Environmental Protection Agency (EPA), and the Utah Department of Environmental Quality (UDEQ; the regulatory support agency for TEAD) as part of their public participation responsibilities under the ***Resource Conservation and Recovery Act (RCRA)***.

Following the review of information received during the public comment period, the Army and UDEQ selected a final corrective measures alternative for SWMU 10. The Decision Document and the ***RCRA Part B permit*** modification will present the selected corrective measures.

The Decision Document highlights information that can be found in greater detail in the Phase I ***RCRA Facility Investigation (RFI)*** Report, the Phase II RFI, the ***Corrective Measures Study (CMS)*** Work Plan, the CMS Report, and other available reports. The Army encouraged the public to review and comment on these supporting documents, which are available at the following locations:

Tooele Army Depot
Public Affairs Office
T-1 Headquarters Building
Tooele Army Depot, UT 84074

Tooele Public Library
47 East Vine Street
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372 S. Marriott
Salt Lake City, UT 84112

Grantsville Public Library
198 West Main Street
Grantsville, UT 84029

* Terms shown in bold italics are defined in the Word Notebook, pages 24 to 26.

PROGRAM SUMMARY

The program summary reviews historical information on TEAD and presents an overview of the RFI (including the human health ***risk assessment (RA)*** and the ***ecological assessment***) and the CMS.

FACILITY BACKGROUND

TEAD is located in Tooele Valley, Tooele County, Utah, immediately west of the City of Tooele (with a population of 13,887 (1990 census)) and approximately 35 miles southwest of Salt Lake City. The installation covers 23,473 acres; 1,700 acres (from an original 25,173) were transferred in December 1998 under the ***Base Realignment and Closure*** (BRAC) program. The surrounding area is largely undeveloped, with the exception of Tooele, Grantsville (population 4,500, north of TEAD), and Stockton (population 400, south of TEAD).

Land use surrounding the Depot includes pasture, cultivation, and rangeland grazing to the west and south. Figure 1 shows the location of TEAD.

TEAD was originally established as the Tooele Ordnance Depot in 1942. It was renamed the Tooele Army Depot - North Area (TEAD-N) in 1962 and given its present designation (TEAD) in June 1996. Since 1942, TEAD was used for the maintenance and repair of Army vehicles and equipment; the storage, maintenance, and disposal of munitions; and the support of other Army installations in the western United States.

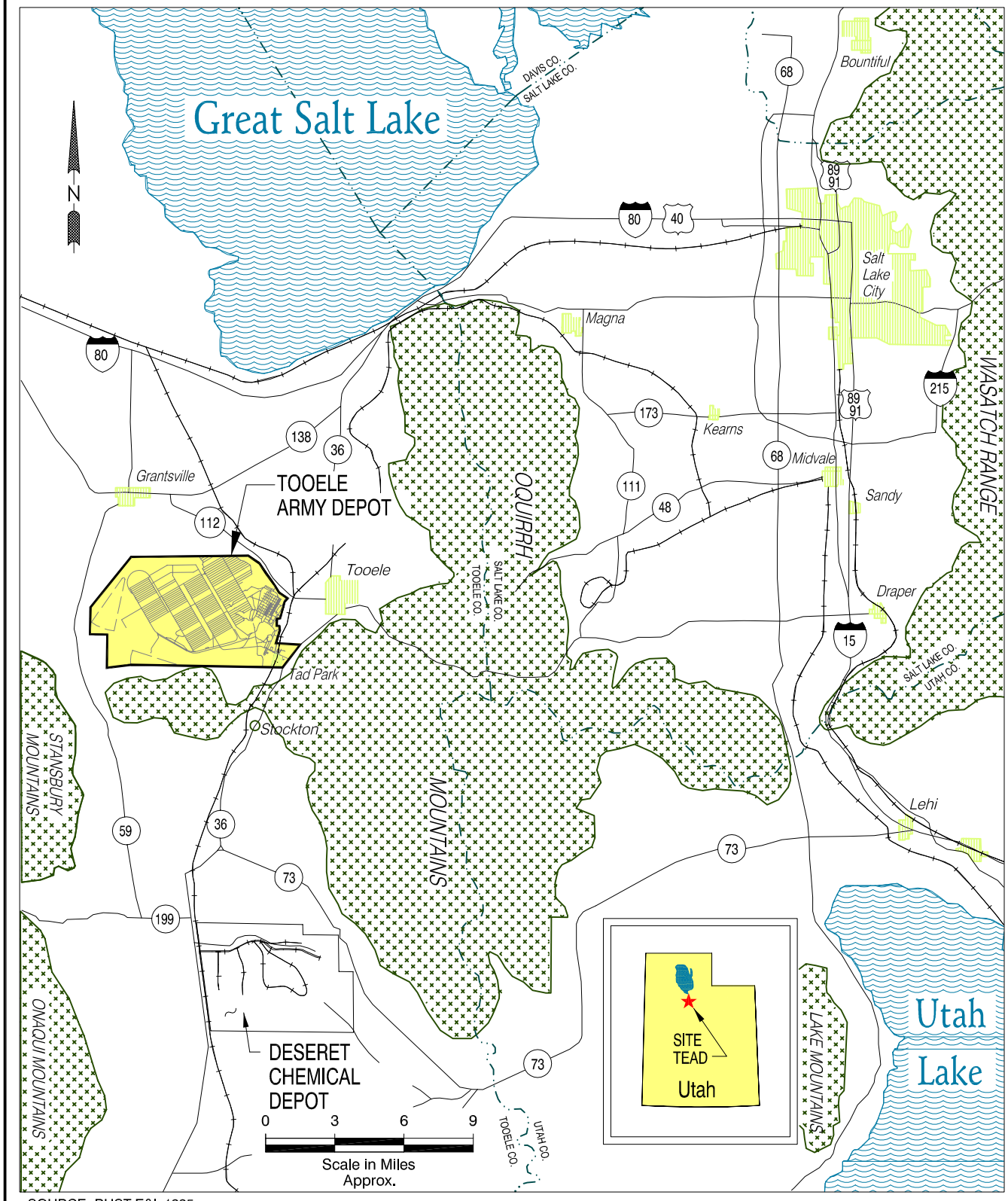
The mission of maintaining and repairing vehicles and equipment was discontinued in 1995. The remaining two missions are expected to continue for the foreseeable future. A portion of TEAD, including the Administration Area and Maintenance Area, was transferred as part of the BRAC program. These areas will be converted from military to industrial use. (The eastern portion of SWMU 30 is included in the BRAC parcel.)

As a result of past operations at TEAD, a variety of known or suspected waste and spill sites have been identified. Environmental investigations from the late 1970s to the present have identified 57 locations referred to as SWMUs.

In October 1990, TEAD was placed on the National Priority List (NPL) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). A Federal Facility Agreement (FFA) between the Army, EPA Region 8, and UDEQ designated 17 of the 57 SWMUs to be investigated under CERCLA.

In January 1991, TEAD was issued a RCRA post-closure permit for the Industrial Waste Lagoon (IWL), SWMU 2. The permit included a Corrective Action Permit (CAP) that required investigation and potential cleanup at 29 of the SWMUs. Currently, there are 40 SWMUs being addressed under the CAP. The Known Releases SWMU 10 discussed in this Decision Document is managed under the RCRA CAP program.

The following sections present an overview of the RFI, including the baseline RA, the ecological assessment, and the CMS. Figure 2 shows the location of SWMU 10 within TEAD. A description of SWMU 10 is provided on pages 16 through 21.



SOURCE: RUST E&I, 1995

FIGURE 1-1
LOCATION MAP OF
TOOELE ARMY DEPOT
AND VICINITY

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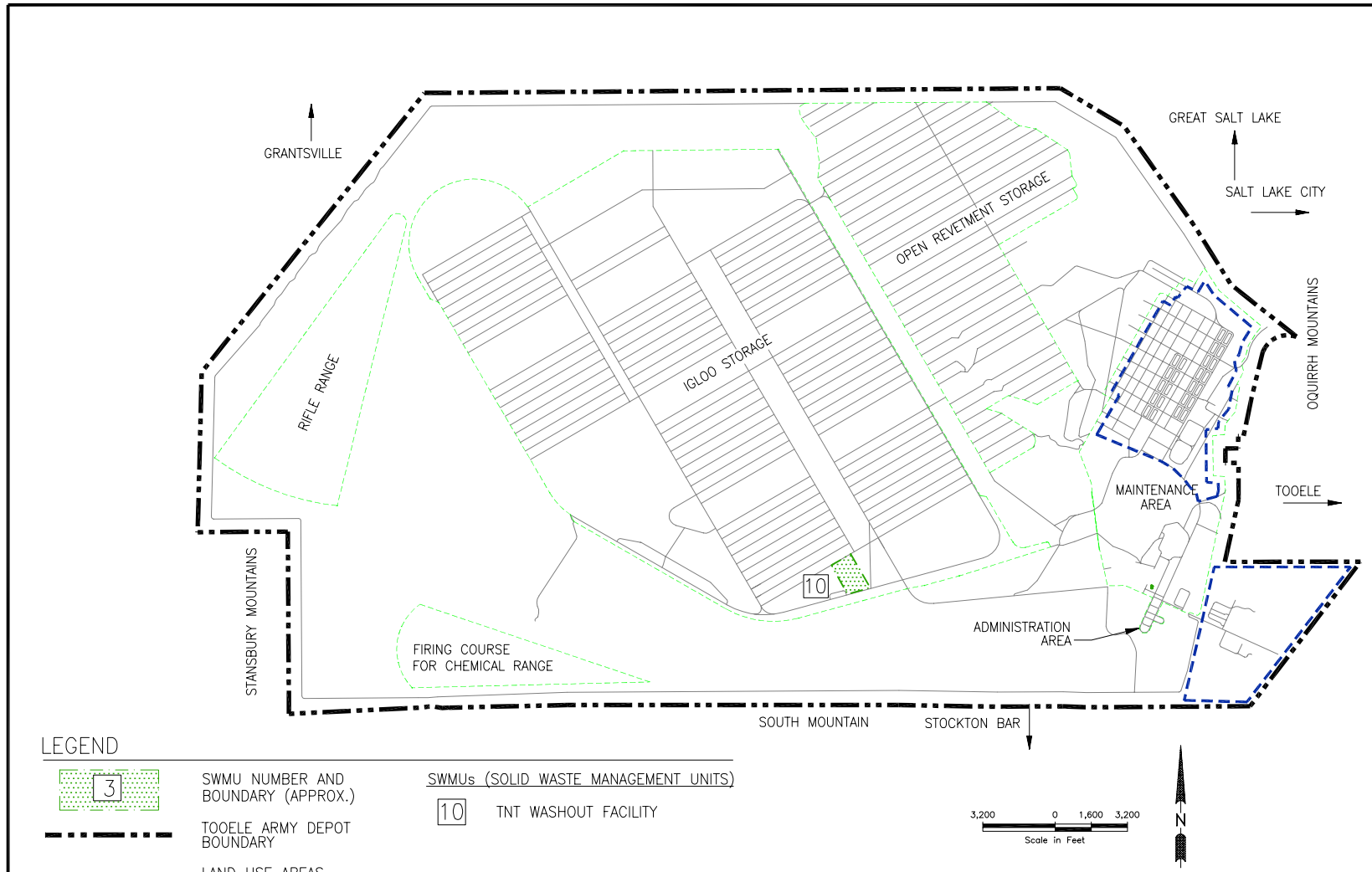

FIGURE 2
LOCATION OF SWMU 10
TOOELE ARMY DEPOT

URS
Dames & Moore

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RCRA FACILITY INVESTIGATION

Investigations were conducted at SWMU 10 to evaluate the presence and extent of chemicals potentially released to the environment from past site activities. These investigations included the following:

- Collection and laboratory analysis of soil, sediment, surface water and groundwater samples to assess SWMU-related contaminant concentrations.

- Comparison of these concentrations to EPA guidelines to evaluate whether they are of potential concern to human health or the environment.

- Comparison of the metals concentrations detected in site samples to ***background*** metals concentrations. (Metals are naturally occurring in both soil and water.)

Chemicals that exceed EPA guidelines were identified ***contaminants of potential concern (COPCs),*** which are those contaminants:

- Detected at levels above those found naturally in the environment.

  – or –

- Detected at levels above EPA guidelines.

The human health RA evaluated potential human health effects due to each of the COPCs. The ecological assessment evaluated potential effects of site contamination on plants and animals. The next two sections describe the RAs.

HUMAN HEALTH RISK ASSESSMENT

In accordance with EPA and State of Utah guidance, the human health RA evaluated potential ***cancer risks*** and ***noncancer health effects*** from exposure to the identified COPCs. Risks and the potential for noncancer health effects are considered for the various ***receptors*** (current Depot worker, current industrial worker, future construction worker, current offsite resident, future adult resident, and future child resident) under different ***exposure scenarios***.

Definition of Cancer Risks, Noncancer Health Effects, and Exposure Scenarios

The American Cancer Society has determined that the expected overall likelihood that an adult will develop cancer during a 70-year lifetime is one in three. The assessment of cancer risks for this program calculates the increased likelihood that an individual will develop cancer as a result of long-term site-related exposure to carcinogens over a 70-year lifetime.

According to EPA and UDEQ, a calculated cancer risk is unacceptable if the increased likelihood of getting cancer is greater than one in 10,000. Furthermore, a cancer risk of less than one in 1 million is considered to be acceptable and does not require remedial action. Sites with cancer risks between one in 10,000 and one in 1 million may require further consideration to determine whether ***corrective action*** is appropriate.

The noncancer assessment calculates the likelihood of toxicological effects other than cancer arising as a result of long-term exposure to contaminants. This is reported as a ***hazard index*** (HI). A calculated HI of less than 1.0 indicates that health effects expected from site-related contaminants are acceptable according to EPA and UDEQ standards.

Hazards may include individual weight gain or loss, organ weight changes, or changes in blood chemistry. They are usually determined based on data from animal laboratory studies or from human studies in the workplace. The term "hazards" is used to refer to noncancer health effects.

Blood lead levels are evaluated as a separate health effect and are treated the same as hazards. This evaluation uses an EPA model for lead uptake from the environment (including soil) into the human body. The U.S. Centers for Disease Control and Prevention (CDC) has established a target limit for lead concentration in children of 10 micrograms per deciliter (µg/dL) of blood in less than 5 percent of the model population. When extrapolated to adults, this limit is 11.1 µg/dL. EPA recommends that this model be used when lead levels in soil equal or exceed 400 micrograms per gram of soil (µg/g).

Potential cancer risks and noncancer hazards are calculated for the current Depot worker, current industrial worker, future construction worker, current offsite resident, future adult resident, and future child resident. These receptors may be exposed to COPCs by a variety of pathways or exposure scenarios. Exposure scenarios can be real or hypothetical, current or future.

The hypothetical residential exposure scenario must be evaluated for all sites (see Section entitled "Regulatory Requirements; page 9). This scenario calculates the risks and hazards for an adult and a child living at the identified site full time. It is assumed that the residents are exposed to **surface soil** through several pathways, including:

- Getting dirt on the skin and absorbing contaminants into the body through the skin (dermal absorption).

- Eating soil directly (children) or inadvertently ingesting soil because hands are unclean (children or adults; ingestion).

- Breathing in dust (inhalation).

- Eating fruits or vegetables grown in contaminated soil (produce ingestion).

- Eating beef from cattle that have grazed on grasses growing in the contaminated soil (beef ingestion).

Using EPA exposure pathway guidelines and site-specific contaminant concentrations, it is possible to calculate the increased likelihood of developing cancer (from carcinogenic contaminants) or being exposed to hazards (from noncarcinogenic contaminants).

Risks and hazards are calculated for an onsite worker under the military land use exposure scenario. This calculation assumes that exposure may occur through ingestion, inhalation, or dermal absorption of surface soil during normal work hours. The worker is not assumed to eat food produced at the site. Also, for purposes of calculating risk, the worker is at the site fewer hours per day, fewer days per year, and fewer years than the resident. These assumptions are based on EPA guidelines and on reasonable information about TEAD workers.

If a SWMU is in the BRAC parcel, the future worker at the site is an industrial worker, not military. EPA provides guidelines for exposure to surface soil (e.g., a 5-day workweek) that differ somewhat from those for a Depot worker, who works 4 days a week. As before, exposure through ingestion, inhalation, and dermal absorption of surface soil are used in the calculation of industrial risks.

A construction worker at any SWMU may encounter subsurface contaminated soil during utility installation, utility maintenance, or construction. This worker may be exposed via ingestion, dermal absorption, or inhalation; however, he or she is not exposed to contaminants in food potentially produced at the site. The construction worker exposure is generally more intense (i.e., inhalation and ingestion rates of soil are higher than for the other exposure scenarios), but of a much shorter duration – which results in comparatively lower risks. EPA guidelines are used in calculating the associated cancer risks and hazards for the construction worker.

Regulatory Requirements

The RFI calculated cancer risks and hazards due to COPCs for the following exposure scenarios:

- Actual current and continued military.

- Future construction.

- Hypothetical future residential (adults and children).

The State of Utah Administrative Code (UAC) 315-101, "Cleanup Action and Risk-Based Closure Standards," also referred to as the "***Risk Rule***," is used to help determine what kind of corrective measures may be required.

The first part of the Risk Rule requires that the human health RA consider the residential exposure scenario for each SWMU. It also specifies the applicable exposure pathways for this scenario. Although residential use is hypothetical, it is evaluated as the scenario most protective of human health. The Risk Rule considers calculated risk for this scenario to be unacceptable if the increased likelihood of getting cancer is greater than one in 1 million

above the expected rate, if the HI is greater than 1.0, or if the modeled blood lead level is greater than the CDC limit of 10 µg/dL.

If there are no unacceptable risks or hazards under the residential scenario and all other applicable regulatory requirements are met, the site can be closed with no further action. However, corrective measures must be evaluated if the residential scenario presents unacceptable risks or hazards.

The extent of corrective measures required is then determined by considering the actual, **reasonably anticipated future land use** (i.e., continued military use at SWMU 10). The Risk Rule considers calculated risk for reasonably anticipated future land use scenarios to be unacceptable if the increased likelihood of getting cancer is greater than one in 10,000 above the expected rate, if the HI is greater than 1.0, or if the estimated blood lead level is greater than the CDC limit of 10 µg/dL.

For sites with unacceptable risks, hazards, or blood lead levels for the reasonably anticipated future land use scenario, corrective action (e.g., excavation or treatment) is evaluated. However, if the calculated risks or health effects are acceptable and all other regulatory requirements are met, only ***management measures*** (e.g., land use or ***deed restrictions***), are required. Potential impacts to groundwater are also considered.

UAC R315-101-3, the "Principle of Non-Degradation," states that a site with contamination must be monitored to ensure levels of contamination in groundwater, surface water, soils, and air do not increase beyond the existing levels of contamination. Immediate corrective action must occur to prevent further degradation of a medium if the level of contamination in that medium increases. The results of the ecological assessment, potential impacts to groundwater, and the extent and concentrations of contaminants are also considered in selecting the most appropriate corrective measure.

By meeting military standards, contaminants may remain onsite at concentrations that, though lowered, may still present risks to the hypothetical future residential receptor. These are called ***residual risks.***

Results

As discussed above, the human health RA considered the hypothetical residential exposure scenario for SWMU 10 even though the Army plans to use this site for continued military purposes. Under the Risk Rule, the RA identified potential unacceptable residential risks or hazards for the hypothetical future residential use scenario at SWMU 10. These potential unacceptable risks require the evaluation of corrective measures.

At a minimum, management measures are required at SWMU 10. However, additional factors – including regulatory requirements and future risks – may call for corrective measures beyond management only.

To determine the extent of corrective action alternatives required, the human health RA subsequently evaluated the reasonably anticipated future land use exposure scenario at SWMU 10 which is military use.

Under the hypothetical future residential land use scenario, cancer risk as high as 2.5 x10^{-2} and HI as high as 6,600 were estimated. So risk greater than one in 1 million and HI greater than 1.0 were identified at SWMU 10.

Under the reasonably anticipated future military and construction land use scenarios, no excess cancer risks above one in 10,000 were identified at SWMU 10. However, an HI of 2.1 (military worker) and an HI of 12 (construction worker) were identified at SWMU 10.

Therefore, based on results from the human health RA, active corrective measures are required at SWMU 10.

ECOLOGICAL ASSESSMENT

The ecological assessment evaluated the potential effects of COPCs on plants and animals, with a focus on the areas and receptors most at risk. The following steps are included in the ecological assessment process:

- Site characterization – which includes surveying site soil, plant life, and animal life.
- Identification of ecological COPCs and their concentrations and toxicity.
- Selection of ecological receptors – the species of plants and animals observed or potentially present at the SWMUs.
- Calculation of ecological hazard quotients (HQs) based on available habitat, COPCs, and ecological receptors.

The ecological assessment of SWMU 10 identified elevated HQs for vegetation growing on the waste ponds due to explosives in soil. However:

1. Ecological HQs are measures of level of concern.
2. Ecological HQs are used as a screening tool not as quantitative risk measures.
3. Ecological HQs greater than 1.0 are not a sole justification for corrective action.

CORRECTIVE MEASURES STUDY

According to the Risk Rule, SWMU 10 presents unacceptable risks and hazards under the hypothetical future residential land use scenario. This SWMU also presents unacceptable health effects for the reasonably anticipated future land use (i.e., military).

The CMS evaluates corrective measures that are protective of both human health and the environment, and that comply with Federal, State, and local requirements. The CMS process includes:

- Development of ***corrective action objectives*** (CAOs), which are chemical-specific concentrations for each land use scenario.
- Comparison of the maximum concentrations of COPCs (i.e., chemicals detected at levels exceeding EPA guidelines, as identified in the RFI Report) to CAOs for the reasonably anticipated land use.
- Comparison of the ***exposure point concentration*** (EPC) for each COC to its CAO, as needed.
- Identification of potentially applicable corrective action alternatives.
- Evaluation and comparison of these alternatives.
- Recommendation of the most appropriate alternative for the SWMU.

Corrective Action Objectives

CAOs are used to focus the development of corrective action alternatives on technologies that are likely to achieve the desired target levels. The primary qualitative CAO is to protect human health and the environment. The corrective measure must meet the intent of Federal, State, and local regulations – in this case, the State of Utah Risk Rule (UAC R315-101, including its "Principle of Non-Degradation"), Utah's Solid Waste Facility Location Standards, Interim Status Requirements for Hazardous Waste Facilities (UAC R315-7), and TEAD's Part B permit.

CAOs may also be quantitative – i.e., target cleanup concentrations for contaminants; they vary for each land use scenario because of the different receptors and exposure pathways.

Identification of Contaminants of Concern

COPCs that exceed CAOs are site-related chemicals that are determined to be responsible for elevated risks under the reasonably anticipated future land use scenario. They are referred to as ***contaminants of concern*** (COCs).

The CAO for chemicals that may cause cancer is the concentration of each compound that results in a potential calculated risk of one in 1 million – which, for industrial/military CAOs, is much stricter than the Risk Rule's acceptable value of one in 10,000. Therefore, in some cases, industrial COCs were identified even though the calculated risk is less than one in 10,000. CAOs are consistent with EPA's acceptable risk range as defined in the National Contingency Plan. The CAO for noncancer-causing chemicals is the concentration of each compound that results in an HI of 1.0. This is equivalent to the Risk Rule's standard. A lead concentration of 1,800 µg/g is equivalent to a blood lead level of 10µg/dL.

The COCs are then evaluated in conjunction with results of the RA to determine what level of corrective actions must be evaluated. The EPC for each COC is compared to its CAO. If the EPC for a compound is less than its CAO, the maximum concentration of that chemical does not pose a human health risk.
Under the reasonably anticipated future land use, the following COCs were identified in surface soil, subsurface soil, and groundwater at SWMU 10:

- 2,4,6-TNT
- Cyclotrimethylenetrinitramine (RDX)

Following Utah and EPA guidance, these COCs were evaluated for distribution and concentration.

In accordance with the Risk Rule, SWMU 10 requires an evaluation of active corrective measures.

Identification and Evaluation of Alternatives

The CMS identifies alternatives for the SWMU that meets the CAOs and are protective of human health and the environment. Each alternative consists of technologies or management measures that address the ***media*** of concern (e.g., groundwater, soil) and the COCs. More than one alternative may be identified for a particular area.

Alternatives are evaluated and compared for the SWMU to determine which alternative best meets the following criteria:

- **Technical criteria**

  Performance – evaluates whether the corrective measures alternative can perform its intended function and meet the CAOs, including compliance with Federal, State, and local regulations. This criterion considers site and waste characteristics, and addresses the useful life of each alternative (i.e., the length of time the alternative maintains its intended level of effectiveness).

  Reliability – describes the long-term effectiveness and permanence of each alternative. This criterion evaluates the adequacy of the corrective measures technology based on performance at similar sites, operation requirements, long-term environmental monitoring needs, and residuals management measures.

  Implementability – assesses the technical and institutional feasibility of executing a corrective measures alternative, including constructability, permit and legal/regulatory requirements, availability of materials, etc. This criterion also addresses the length of time from implementation of the alternative until beneficial effects are realized.

  Safety – considers the potential threats to workers, nearby communities, and the environment during implementation of the corrective measure.

- **Human health assessment** – evaluates the extent to which each alternative protects human health. This criterion considers the classes and concentrations of contaminants left onsite, potential exposure routes, and potentially affected populations. Residual contaminant

concentrations are also compared to existing criteria, standards, or guidelines.

- **Environmental assessment** – evaluates short-and long-term effects of the corrective measure on the environment, including adverse impacts to environmentally sensitive areas.
- **Administrative feasibility** – considers compliance with applicable Federal, State, and local environmental and public health standards, requirements, criteria, or limitations.

- **Cost** – presents ***capital*** and annual ***operation and maintenance (O&M)*** costs for each corrective measures alternative. Capital costs include direct and indirect costs. Annual costs typically include labor, maintenance, energy, and sampling/analysis. For purposes of comparison, costs are presented in terms of ***present worth***, which is the current value of a future expenditure. The cost estimates are based on conventional cost estimating guides, vendor information, and engineering judgment.

Recommended Alternative

For SWMU 10, the alternative that best protects human health and the environment, has proven reliable at other sites, and meets regulations is recommended to the public and UDEQ.

A detailed evaluation of alternatives is presented in the next section.

The recommended corrective measures alternative for the TNT Washout Facility (SWMU 10) is noted below:

- Excavation of contaminated soil, on-site ***composting*** to treat the contaminated soil and vegetation, groundwater monitoring of the RDX plume, and ***land use restriction***s to prevent residential use of the site.

SWMU 10 (TNT WASHOUT FACILITY) SUMMARY

This section summarizes background information and results of the RFI, the human health RA, ecological assessment, and the CMS for SWMU 10.

SWMU 10 (TNT WASHOUT FACILITY)

SWMU 10 is slated to remain in use by the military. The TNT Washout Facility was constructed in 1948 and was operable through 1986. It consisted of the bomb reconditioning building (Building 1245), a storage facility (Building 1246), eight unlined old TNT washout ponds, one new unlined TNT washout pond, two in-ground steel settling basins, a series of unlined ditches, and underground piping.

Operations at SWMU 10 consisted of decommissioning projectiles, bombs, rocket heads, and other munitions filled with 2,4,6-TNT, composition B, RDX, and tritonal. Decommissioning consisted of opening munition casings and using steam to remove the explosives. The casings were then rinsed with water which was filtered and discharged to two outdoor steel-lined settling basins, then sent via both underground piping and aboveground ditches to the old unlined TNT washout ponds.

In fall 1984, the old washout ponds were closed by covering them with a PVC liner and placing a soil cover over the liner. A new washout pond was built to receive rinsewater.

Red-stained soil (identified as sediment) has been found at depths ranging from immediately below the PVC cover to approximately 5 feet below ground surface.

In 1986, bomb reconditioning at Building 1245 ceased, along with rinsewater discharge to the new washout pond. Building 1246 has been demolished and the discharge trough and settling tanks have been removed.

Summary of RFI – Explosives were detected in surface and subsurface soil in the area of the old washout ponds and were identified as COPCs. The highest concentrations of explosives were found beneath the PVC liner to a depth of approximately 7 feet below ground surface. Elevated levels of explosives at this location were also detected in a perched water zone, at approximately 30 to 45 feet deep. ***Semi-volatile organic compounds (SVOCs)*** and explosives were detected in subsurface soil beneath the new TNT washout pond and were identified as COPCs.

Explosives, metals, ***volatile organic compounds (VOCs)***, and one SVOC were detected in groundwater onsite. However, the 2001 groundwater sampling results detected only RDX. RDX was detected at two wells at SWMU 10 with a maximum concentration of 13.1 µg/L. Explosives were also detected in groundwater in the localized groundwater ***perched zone*** (17 to 49 feet below ground surface), which acts to reduce downward movement of contaminants and instead allows horizontal movement along the ***clay layer***.

Summary of RAs – The human health RA identified cancer risks greater than the target value of $1x10^{-6}$ for the hypothetical future onsite residential child and adult receptors, and elevated HIs for both receptors. No elevated cancer risks were identified for the current and likely future depot personnel and the future

construction worker receptors; however, elevated HIs were identified for all receptors.

Regulatory Requirements – Because adverse health effects were identified for the hypothetical future onsite adult and child residents, the Risk Rule requires that corrective measures be evaluated for this SWMU. In addition, because the identified hazard to the actual current and likely future Depot personnel exceeds 1.0, the Risk Rule requires corrective action.

Identification of Corrective Measures Alternatives – COCs were identified in surface and subsurface soil samples at SWMU 10, and unacceptable HI values were identified for current and likely future Depot personnel. Therefore, corrective action is required at this SWMU. In addition, the Principle of Non-Degradation requires that soil contamination does not increase existing levels of groundwater contamination. Unacceptable risks to ecological receptors were also identified. Finally, the Risk Rule states that management measures must be evaluated for sites that exceed the threshold of 1×10^{-6} risk or 1.0 HI for the hypothetical future residential land use scenario. Five corrective measures alternatives were considered for SWMU 10. Each alternative addresses approximately 5,000 cubic yards of contaminated soil and vegetation at the site.

Treatment technologies are not considered for soil in the perched zone (e.g., 40 ft bgs) because there is no exposure of humans or ecological receptors at this depth and because, once the primary contaminant source (i.e., surface and near-surface soil) is removed, further impacts to groundwater are not expected.

Alternative 1 – Excavation, composting, groundwater monitoring, and land use restrictions

This alternative includes excavation of contaminated soil at levels above military use CAOs and treatment of the contaminated soil and vegetation onsite through composting. Composting uses indigenous microorganisms to biodegrade the soil contamination. The excavated soil is mixed with nutrients under controlled conditions which allow biodegradation to occur. Once biodegradation is complete the soil can be returned to the excavated area. Wherever excavation occurs, the existing PVC liner will be removed.

A groundwater monitoring program will monitor and document the movement, if any, of the RDX plume. If movement exceeds expectations, then the program requires a reevaluation of groundwater.

Land use restrictions prohibiting future groundwater and residential use at SWMU 10 will be incorporated into TEAD's **master land use plan**. Environmental protection plans are developed for the master plan to identify land use restrictions as well as maintenance and monitoring required under those restrictions. These plans include legal descriptions and maps.

Alternative 2 – Excavation, composting, groundwater treatment, and land use restrictions

This alternative includes excavation of contaminated soil at levels above military use CAOs and treatment of the contaminated vegetation and soil onsite through composting. Composting uses indigenous microorganisms to biodegrade the soil contamination. The excavated soil is mixed with nutrients under controlled conditions which allow biodegradation to occur. Once biodegradation is complete the treated soil can be returned to the excavated area.

Contaminated groundwater will be extracted and treated using granular activated carbon. The clean water will then be reinjected into the aquifer.

Land use restrictions are to be incorporated into TEAD's master land use plan as described under Alternative 1. These institutional controls are applied to prevent future groundwater and residential use.

Alternative 3 – Excavation, slurry-phase biological treatment, groundwater monitoring, and land use restrictions

This alternative includes excavation of contaminated soil at levels above military use CAOs, and treatment of the contaminated soil onsite through slurry phase biological treatment. This treatment method uses a slurry phase bioreactor which mixes the soil with water, nutrients, and oxygen so that microorganisms can biodegrade the soil contamination. This alternative evaluates two different ***bioslurry*** processes – ***Argonne*** and ***Simplot Anaerobic Bioremediation (SABRE)***. Once biodegradation is complete, the soil is dewatered and can then be returned to the excavated area. Wherever excavation occurs, the existing PVC liner will be removed.

Contaminated vegetation is transported off-post for proper disposal.

A groundwater monitoring program will monitor and document the movement, if any, of the RDX plume. If the plume movement exceeds expectations, then the groundwater program is reevaluated.

Land use restrictions are to be incorporated into TEAD's master land use plan as described in Alternative 1. These institutional controls are applied to prevent future groundwater and residential use.

Alternative 4 – Excavation, off-post treatment/disposal, groundwater monitoring, and land use restrictions

This alternative includes excavation of contaminated soil at levels above military use CAOs using an excavator, backhoe, or similar equipment. The existing PVC liner will be removed.

The excavated soil undergoes a soil profile analysis to determine if the soil exhibits a listed or characteristic RCRA hazardous waste. A preliminary review of the site contaminants and potential waste processes contributing to the contamination at SWMU 10 suggest that the explosives in soil are not listed wastes. The contaminant data suggests that some of the soil may exhibit a RCRA characteristic waste due to 2,4-dinitrotoluene (2,4-DNT). A final waste determination will be made during the corrective action phase. A review of other regulations (e.g., State of Utah, DOT) and additional testing (e.g., TCLP) will be necessary to make this determination.

The CMS report assumed that the contaminated soil is sent to a **treatment, storage, and disposal facility (TSDF)** for incineration. However, if the soil profile results are acceptable, soil that does not exhibit a characteristic waste soil could be sent to an off-post Subtitle D landfill for disposal. The excavated soil is transported and manifested in compliance with applicable regulations. The excavated area is backfilled with clean soil.

A groundwater monitoring program will monitor and document the movement, if any, of the RDX plume. If the plume movement exceeds

expectations, then the groundwater program is reevaluated.

Land use restrictions are to be incorporated into TEAD's master land use plan as described in Alternative 1. These institutional controls are applied to prevent future groundwater and residential use.

Alternative 5 – Multilayer cap, groundwater monitoring, and land use restrictions

This alternative includes construction of a multilayer cap to prevent exposure to human or ecological receptors and limit the infiltration of precipitation to the contaminated soil. The multilayer cap will have a foundation soil layer, a drainage layer, a geosynthetic barrier layer, and a protective soil layer.

The cap shall be surrounded by a fence. Annual inspections and maintenance of the cap and fence shall occur.

A groundwater monitoring program will monitor and document the movement, if any, of the RDX plume. If the movement exceeds expectations, the program will be reevaluated.

Land use restrictions are to be incorporated into TEAD's master land use plan as described in Alternative 1. These controls are applied to prevent future groundwater and residential use.

Evaluation of Alternatives – The proposed corrective measures alternatives for SWMU 10 are evaluated and compared below.

- Technical criteria

  Performance – Alternative 1 (excavation, composting, groundwater monitoring, and land use restrictions), Alternative 2 (excavation, composting, groundwater treatment, and land use restrictions), and Alternative 4 (excavation, off-post treatment/disposal, groundwater monitoring, and land use restrictions) are each rated high with respect to performance. All five of the alternatives meet both the quantitative and qualitative CAOs. However, Alternative 5 (multilayer cap, groundwater monitoring, and land use restrictions) is rated moderate for performance because it is not a permanent remedy and it only meets the CAOs if the cap is properly maintained. Alternative 3 (excavation, slurry-phase biological treatment, groundwater monitoring, and land use restrictions) is rated moderate because pilot- and bench-scale treatability studies are required to determine the ability of native microorganisms to degrade contaminants and to optimize process variables.

  Reliability – Each alternative has been shown to be effective at other sites. However, Alternative 3 is rated moderate for reliability because slurry-phase biological treatment has not been proven cost effective for large amounts of explosives-contaminated soil. In addition, the complex slurry treatment system may require more maintenance than the other treatment alternatives. Alternative 2 is also rated moderate; the groundwater extraction and treatment system requires long-term O&M. Alternative 5 is rated moderate because it does not permanently remove site contamination, providing a vegetative cover over the cap may prove difficult, and it requires annual inspection and maintenance of the fence and cap. Alternatives 1 and 4 are the most reliable corrective measures for SWMU 10, and each receives a high rating.

Implementability – Alternative 3 is rated moderate for implementability because slurry-phase biological treatment requires a more complicated engineering design and construction than the other alternatives. Alternative 2 requires the installation of wells and the GAC treatment system, and is rated moderate when compared to implementation of groundwater monitoring in Alternatives 1, 3, 4, and 5. Both Alternatives 1 and 4 are rated high because minimal engineering and design are required. Alternative 5 is rated moderate because although it consists of commonly used materials, maintaining the cap in the arid conditions at TEAD may be difficult.

With respect to treating contaminated soil, Alternatives 1 and 2 require approximately 1.25 years to treat 5,000 yd3 of explosives-contaminated soil, and Alternative 3 requires about 1.5 years. Alternative 5 requires approximately 2 to 3 months. Alternative 4 requires approximately 40 days for excavation and transport of soil to the off-post incinerator. Based on this evaluation, Alternatives 4 and 5 are the most attractive in terms of implementability.

Safety – Each alternative requires appropriate PPE during O&M activities. Alternative 3 is rated moderate because it is likely to require more safety controls than the other alternatives. The slurry component requires a more complex treatment system, including construction of a reinforced concrete pad, lagoons or reactor tanks, and the screening plant and fluidizer, in addition to setup and operation of the equipment that holds the mixers. Alternatives 1 and 2 are rated moderate because they require extensive use of motorized equipment and involve the excavation and treatment of contaminated soil. Alternative 2 also involves the installation of wells and the groundwater treatment system. Alternative 4 receives a moderate rating because – though it requires minimal safety controls during onsite operations – it presents the most potential risks to the community during off-post transport of contaminated soil. Alternative 5 is rated high for safety because it requires limited excavation and handling of contaminated soil, and only limited transport of hazardous materials (i.e., vegetation); it presents no significant short-term risk to off-post residential communities or on-post workers.

- **Human health assessment** – All five alternatives are protective of human health and are rated high. Alternative 5 protects human health by containing the COCs at the site beneath the cap. Alternatives 1, 2, and 3 prevent both short- and long-term exposure to contaminated soil through treatment. Alternative 4 removes the contaminated soil from SWMU 10.

- **Environmental assessment** – The excavation and treatment of explosives-contaminated soil in the first four alternatives equally reduce potential effects on ecological receptors by removing the contaminated soil from the site. Alternative 5 contains a multilayer cap which will minimize the exposure of ecological receptors to contaminants at the site. The removal of RDX-contaminated vegetation reduces ecological risks, as well. See Appendix C. Each alternative is rated high.

- **Administrative feasibility** – Each alternative meets the requirements specified in UAC R315-101 and is rated high for this criterion. It should be noted that a RCRA

treatment permit may be required for Alternatives 1, 2, and 3.

- **Cost** – The estimated present worth cost of implementing each alternative is as follows – $2,470,000 (Alternative 1); $4,450,000 (Alternative 2); $4,260,000 (Alternative 3, Argonne process) and $4,240,000 (Alternative 3, SABRE process); $4,170,000 (Alternative 4); and $2,130,000 (Alternative 5).

Recommended Alternative – Excavation, composting, and groundwater monitoring (Alternative 1) are recommended at SWMU 10. It includes excavation of soil with explosives at levels above military use CAOs, treatment of the contaminated soil and site vegetation through composting, return of treated material to the excavated area, and placement of a soil cover. Confirmation samples are collected following excavation, but before composted soil is returned to the area, to verify that all of the contaminated soil has been removed. Composting produces a stabilized product that is 20 to 30 percent greater in volume. Land use restrictions are applied to prevent groundwater use and future residential use of SWMU 10. The groundwater is not a source of drinking water and groundwater monitoring will document the plume migration. A contingency plan will be enacted if the plume migrates toward the base boundary (which is not expected) and off-post receptors.

Land use restrictions are to be incorporated into TEAD's master land use plan. Because U.S. Army regulations direct that all revisions to the plan be evaluated with regard to potential effects on human health and the environment, unauthorized future use (i.e., residential) of SWMU 10, or transfer under BRAC requires the resolution of conflicts between identified risks and proposed changes in land use. Periodic inspections will ensure restrictions are being observed. This alternative meets CAOs and is protective of human health and the environment.

Composting, groundwater monitoring, and land use restrictions provide a long-term and permanent reduction in the risks associated with SWMU 10. The residual risk results from soil with explosives at concentrations at or below military use CAOs but above residential use CAOs. Land use restrictions prevent the completion of exposure pathways and further reduce risk.

RECOMMENDED ALTERNATIVE

The recommended alternative for SWMU 10 is listed below. Table 1 presents a comparative analysis of the alternatives.

- SWMU 10 (TNT Washout Facility)
  - Excavation, composting, groundwater monitoring and land use restrictions

TABLE 1

Summary of Comparative Analysis of Corrective Measures Alternatives
TNT Washout Facility (SWMU 10)
Tooele Army Depot

SWMU	Technical Evaluation							
Corrective Measures Alternative (a)	**Performance**	**Reliability**	**Implementability**	**Safety**	**Human Health Assessment**	**Environmental Assessment**	**Administrative Feasibility**	**Cost ($)**
TNT Washout Facility (SWMU 10)								
Alternative 1: Excavating, composting, groundwater monitoring, and land use restrictions	Meets all identified CAOs; likely to achieve quantitative CAOs in 1.25 years	Proven effective at other sites; some O&M and long term groundwater monitoring required	Easily implemented under current conditions	Short-term risk to onsite workers minimized by engineering and safety controls	Protective of human health	Prevents exposure of ecological receptors to contaminated soil	Meets requirements of UAC R315-101	2,470,000
Alternative 2: Excavating, composting, groundwater treatment, and land use restrictions	Meets all identified CAOs; likely to achieve quantitative CAOs in 1.25 years	Proven effective at other sites; some O&M and long term groundwater monitoring and treatment system O&M required	More complicated engineering design required for groundwater treatment system	Short-term risk to onsite workers minimized by engineering and safety controls	Protective of human health	Prevents exposure of ecological receptors to contaminated soil	Meets requirements of UAC R315-101	4,450,000
Alternative 3: Excavating, slurry-phase biological treatment, groundwater monitoring, and land use restrictions	Meets all identified CAOs; likely to achieve quantitative CAOs in 1.5 years; treatability study required and can only be conducted during the nine warmer months of the year	Proven effective at other sites for smaller volumes of soil; long term groundwater monitoring and treatability study required	More complicated engineering design required	Short-term risk to onsite workers minimized by engineering and safety controls	Protective of human health	Prevents exposure of ecological receptors to contaminated soil	Meets requirements of UAC R315-101	4,260,000 (Argonne process) or 4,240,000 (SABRE process)
Alternative 4: Excavation, off-post treatment/ disposal, groundwater monitoring, and land use restrictions	Meets all identified CAOs; likely to achieve quantitative CAOs in 40 days	Proven effective at other sites; long term groundwater monitoring required	Easily implemented under current conditions	Short-term risk to off-post communities and onsite workers minimized by engineering and safety controls	Protective of human health	Prevents exposure of ecological receptors to contaminated soil	Meets requirements of UAC R315-101	4,170,000
Alternative 5: Multilayer cap, groundwater monitoring, and land use restrictions	Meets all identified CAOs if landfill cover is properly maintained	Proven effective at other sites; long-term cover O&M and groundwater monitoring required	Maintaining cap in the arid conditions at TEAD may be difficult	Short-term risk to onsite workers minimized by engineering and safety controls	Protective of human health	Prevents exposure of ecological receptors to contaminated soil	Meets requirements of UAC R315-101	2,130,000

(a) The recommended corrective measures alternative is shown in bold italic type.

WORD NOTEBOOK

Argonne process: A bioslurry process that operates in an aerobic/anaerobic sequence.

Background: Concentrations in environmental samples collected from surrounding areas not affected by site activities.

Base realignment and closure (BRAC): Program under which the U.S. Army facilitates and promotes conversion of excess Army facilities and property to private or public sector reuse.

Bioslurry treatment: A bioremediation process for explosives-contaminated soil in which soil is mixed with nutrients and contaminants are biodegraded through microbial activity.

Blood lead level The concentration of lead in a person's blood, usually measured in micrograms per deciliter.

Cancer risk: The increased likelihood that an individual will develop cancer as a result of site-related exposure over a 70-year lifetime.

Capital cost: Direct construction costs, such as labor and materials, plus indirect costs, such as engineering and permitting.

Clay layer: A discontinuous clay-rich zone in the subsurface which often retards the downward flow of groundwater.

Composting: A combined biological and engineering process that – through the addition of nutrients – causes the degradation of organic chemicals via microbiological activity.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA): A program established to identify and clean up sites where hazardous substances have been or may have been released to the environment. This Act is commonly known as Superfund.

Contaminants of concern (COCs): Chemicals present at levels above quantitative CAOs.

Contaminants of potential concern (COPCs): Chemicals present at levels above background or EPA or State guidelines. Determined during the RFI phase of the RCRA process; all COPCs were included in the human health RA and ecological assessment.

Corrective action: An action that physically changes the site to meet corrective action objectives. See "management measure."

Corrective action objective (CAO): Goal for protecting human health and the environment. A quantitative CAO is the numerical goal for cleanup of media (e.g., soil, water).

Corrective action permit (CAP): Specifically for TEAD, a permit issued by the State in January 1991 to address the cleanup of contaminated groundwater; required the Army to investigate the possible contamination of 40 SWMUs at TEAD.

Corrective measure: Management control or technology to clean up or minimize the migration of contaminants or to reduce exposure to humans/wildlife.

Corrective measures study (CMS): Component of the RCRA process that identifies, screens, and compares corrective measures alternatives for site-specific contamination and risk.

Covenants, Conditions, and Restrictions (CCRs): Deed restrictions on BRAC

property are governed by the Declaration of Covenants, Conditions, and Restrictions for Economic Development Conveyance, November 1998. The CCRs dictate that deed restrictions are enforceable by the U.S. Government, the Redevelopment Agency of Tooele City, and the transferee, or by other designated government agencies.

Decision Document: Presents the preferred corrective measures alternatives for selected sites; required as public participation responsibilities under RCRA.

Deed restriction: A legally binding notice in a real property deed that limits the actual use of an area; applicable to sites that are part of the BRAC program.

Ecological assessment: Process to identify all components of the biological system at a defined site, to determine the potential effects of contaminants, and to identify possible remedies for potential problems.

Exposure point concentration (EPC): Statistically derived value representing the likely concentration that an individual will be exposed to if he or she in working/living in the area of the SWMU.

Exposure scenario: A combination of an exposure pathway (i.e., release point to receptor) and receptor-specific variables (intake, contact rate, body weight, and exposure frequency).

Federal facility agreement (FFA): Legal document that describes the rules and responsibilities of the Army, EPA, and State of Utah in determining risks and providing agreed-upon corrective action.

Hazard index (HI): Likelihood of adverse health effects from exposure to chemicals that do not cause cancer, HI values less than 1.0 indicate a low likelihood; greater than 1.0 a high likelihood.

Land use restriction: A restriction in land use that limits the actual use of an area; applicable to sites that are not part of the BRAC program. Restrictions are incorporated into the TEAD master land use plan.

Management measure: Control such as fencing, deed restrictions, or monitoring that includes no physical removal or treatment of identified contaminants.

Media: Elements of the environment, such as soil, sediment, groundwater, surface water, and air.

Master land use plan: Plan maintained by each Federal facility that specifies land use. The overall purpose of the master plan is to describe and analyze existing facilities, conditions, and future requirements of the installation. The real property planning board has authority over land use at the base, and is responsible for developing, enforcing, and modifying the installations master land use plan. This document must be reviewed prior to obtaining the programming documents required for approval of new construction.

National Priority List (NPL): Established by EPA, a list that identifies sites eligible for remedial action under CERCLA. EPA has a structured program for evaluating sites and placing them on the NPL.

Noncancer health effects: Adverse health effects other than cancer, which may include

weight loss or gain, organ changes, or blood chemistry changes.

Operation and maintenance (O&M) costs: Costs of annual operation and maintenance, including labor and materials.

Present worth: If invested at the start of a project, the amount of money that is sufficient to cover all costs (capital costs and annual O&M) over the planned life of the corrective measure.

RCRA facility investigation (RFI): Component of the RCRA process that identifies the types, amounts, and locations of contaminants.

RCRA Part B permit: Permit issued by the State for operation of hazardous waste facilities; TEAD maintains a RCRA Part B permit for operation of the sewage lagoons and the open burn areas.

RCRA post-closure permit: Permit issued by the State that defines actions required at a closed RCRA site.

Reasonably anticipated future land use: A realistic assessment of land use from a consensus of community and local planning authorities, based on federal/state land use designation, comprehensive community master plans, and zoning laws or maps.

Receptor: A human, plant, or animal at the receiving end of an exposure pathway.

Residual risk: Risk from materials or chemical remaining onsite.

Resource Conservation and Recovery Act (RCRA): Provides a regulatory program for active sites to prevent mismanagement of hazardous solid waste.

Risk assessment (RA): Appraisal of the actual or potential effects of a hazardous waste SWMU on human health and the environment.

"Risk Rule": State of Utah regulation, "Cleanup Action and Risk-Based Closure Standards" (UAC R315-101).

SABRE process: A bioslurry process that operates anaerobically.

Semivolatile organic compounds (SVOCs): Substances composed primarily of carbon and hydrogen atoms that have boiling points greater than 200 degrees Celsius. Common SVOCs include PAHs and PCBs.

Solid waste management unit (SWMU): Area where hazardous substances, pollutants, and contaminants may have been disposed.

Treatment, storage, and disposal facility (TSDF): Facility capable of treating storing, or disposing of hazardous waste.

Volatile organic compound (VOC): One group of carbon-containing compounds that evaporate readily at room temperature. Examples of VOCs include trichloroethane, trichloroethylene, benzene, and toluene.

Washout: Operation in which old munitions were decommissioned by opening casings, removing explosives, and rinsing.

ACRONYMS AND ABBREVIATIONS

BRAC	Base Realignment and Closure
CAO	Corrective action objective
CAP	Corrective Action Permit
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CMS	Corrective Measures Study
COC	Contaminant of concern
COPC	Contaminant of potential concern
2,4-DNT	2,4-Dinitrotoluene
EPA	U.S. Environmental Protection Agency
EPC	Exposure point concentration
FFA	Federal Facility Agreement
HI	Hazard index
IWL	Industrial Waste Lagoon
LDR	Land disposal restriction
µg/dL	Microgram per deciliter
µg/L	Microgram per liter
µg/g	Microgram per gram
NPL	National Priorities List
O&M	Operation and maintenance
PVC	Polyvinyl chloride
RA	Risk Assessment
RCRA	Resource Conservation and Recovery Act
RDX	Cyclotrimethylenetrinitramine
RFI	RCRA Facility Investigation
RI	Remedial Investigation

ACRONYMS AND ABBREVIATIONS (cont'd)

SABRE	Simplot Anaerobic Bioremediation
SVOC	Semivolatile organic compound
SWMU	Solid waste management unit
TCLP	Toxicity characteristic leaching procedure
TEAD	Tooele Army Depot
TEAD-N	Tooele Army Depot - North Area
TNT	Trinitrotoluene
TSDF	Treatment, storage, and disposal facility
UAC	Utah Administrative Code
UDEQ	Utah Department of Environmental Quality
VOC	Volatile organic compounds

GLOSSARY OF EVALUATION CRITERIA

Technical criteria

Performance – evaluates whether the corrective measures alternative can perform its intended function and meet the CAOs, including compliance with Federal, State, and local regulations. This criterion considers site and waste characteristics, and addresses the useful life of each alternative (i.e., the length of time the alternative maintains its intended level of effectiveness).

Reliability – describes the long-term effectiveness and permanence of each alternative. This criterion evaluates the adequacy of the corrective measures technology based on performance at similar sites, O&M requirements, long-term environmental monitoring needs, and residuals management measures.

Implementability – assesses the technical and institutional feasibility of executing a corrective measures alternative, including constructability, permit and legal/regulatory requirements, availability of materials, etc. This criterion also addresses the length of time from implementation of the alternative until beneficial effects are realized.

Safety – considers the potential threats to workers, nearby communities, and the environment during implementation of the corrective measure.

Human health assessment – evaluates the extent to which each alternative protects human health. This criterion considers the classes and concentrations of contaminants left onsite, potential exposure routes, and potentially affected populations. Residual contaminant concentrations are also compared to existing criteria, standards, or guidelines.

Environmental assessment – evaluates short- and long-term effects of the corrective measure on the environment, including adverse impacts to environmentally sensitive areas.

Administrative feasibility – considers compliance with applicable Federal, State, and local environmental and public health standards, requirements, criteria, or limitations.

Cost – presents capital and annual O&M costs for each corrective measures alternative. Capital costs include direct and indirect costs. Annual costs typically include labor, maintenance, energy, and sampling/analysis. For purposes of comparison, costs are presented in terms of ***present worth***, which is the current value of a future expenditure. The cost estimates are based on conventional cost estimating guides, vendor information, and engineering judgment.

INSTALLATION REVIEW
OF THE SELECTED ALTERNATIVE AT SWMU 10

The selected alternative for the TNT Washout Facility (SWMU 10) is excavation of contaminated soil, on-site soil and vegetation composting, groundwater monitoring, and land use restrictions. The total cost is estimated at $2,470,000. The appropriate approval authority for this action is the U.S. Army Environmental Center.

LARRY McFARLAND
Restoration Program Manager
Tooele Army Depot, Utah

Date

KATHY ANDERSON
Public Affairs/Protocol Office
Tooele Army Depot, Utah

Date

FRANK BRUNSON
Legal Office
Tooele Army Depot, Utah

Date

ARNOLD P. MONTGOMERY
LTC, OD
Commanding
Tooele Army Depot, Utah

Date

SIGNATURES AND SUPPORT AGENCY ACCEPTANCE OF THE SELECTED ALTERNATIVE AT SWMU 10

The selected alternative for the TNT Washout Facility (SWMU 10) is excavation of contaminated soil, on-site soil and vegetation composting, groundwater monitoring, and land use restrictions. The total cost is estimated at $2,470,000. The appropriate approval authority for this action is the U.S. Army Environmental Center.

JAMES M. DE PAZ
Colonel, CM
Commanding
U.S. Army Environmental Center

Date

DECLARATION STATEMENT FOR SWMU 10

The selected corrective measure for the TNT Washout Facility is protective of human health and the environment, attains Federal and State requirements, and is cost effective. This corrective measure satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility or volume as a principal element and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.